TOPIC OVERVIEW DOCUMENT

YEAR 12

TOPIC OVERVIEW:

These Year 12 topics build directly on KS4 Maths by extending familiar GCSE knowledge into more complex and abstract applications. Algebra develops GCSE skills in manipulating expressions, quadratics, equations and inequalities, introducing more advanced work with indices, surds and algebraic forms. Graphs and transformations build on GCSE graph work by exploring functions and transformations in greater depth. Mechanics applies GCSE knowledge of forces, motion, graphs and algebra to mathematical models of real situations. Data collection builds on GCSE statistics by developing a deeper understanding of sampling, types of data, bias and the reliability of statistical conclusions. Together, these topics strengthen the algebraic fluency, reasoning, modelling and problem-solving skills needed for success in A-level Mathematics.

Strong algebraic manipulation supports more advanced work with functions, calculus, exponentials, logarithms and differential equations. Graphs and transformations prepare students to analyse more complex functions and make connections between graphical and algebraic representations. Mechanics modelling develops the skills needed for more challenging problems involving forces, motion, moments and connected particles. Data collection provides the statistical understanding required for hypothesis testing, probability distributions and interpreting data. Overall, these topics develop the fluency, reasoning and modelling skills needed to confidently tackle more complex Year 13 mathematics.

Key Vocabulary (T2)	Key Vocabulary (T3)	Core knowledge	Disciplinary Skills
Evaluate, justify, compare, represent, predict, estimate, assess, identify, recognise, apply, select, explain, investigate, conclude, generalise, reliable, accurate, appropriate, reasonable, significant, assumption, limitation, relationship, evidence, method, strategy, context, bias, validity, implication.	Variable Expression Equation Inequality Factorisation Population Force Mass Speed Resistance Lamina	Being able to expand brackets, factorise expressions, and simplify algebraic forms. In Year 12 Maths, students develop core knowledge in simplifying and manipulating algebraic expressions, solving quadratics, equations and inequalities, and interpreting graphs and transformations. They also learn how mathematics can model real-life situations through mechanics, and develop statistical skills by understanding how data is collected, sampled and interpreted. Understanding key statistical terms such as population, sample, census, sampling frame, parameter, and statistic. Knowing different sampling methods (simple random, systematic, stratified, quota, opportunity) and how each one is carried out. Recognising types of data (qualitative/quantitative, discrete/continuous) and understanding how these influence the choice of statistical techniques. Knowing the advantages and	These topics develop disciplinary skills in algebraic fluency, logical reasoning, problem solving and mathematical modelling. Students learn to manipulate and represent mathematical information accurately, recognise patterns and relationships, select efficient methods, interpret graphs and data, make and justify assumptions, apply mathematics to unfamiliar contexts, and evaluate whether solutions are reasonable. Evaluating whether a modelling assumption is reasonable in a given context and understanding how it affects the accuracy of predictions. Interpreting the limitations of a model and identifying where real-world behaviour may differ from the idealised version. Evaluating the suitability of different sampling methods for a given context, including issues of bias, practicality, and representativeness. Critically assessing the reliability and limitations of collected data, including potential sources of error or bias in surveys or experiments. Making informed decisions about how to design a data-collection

		disadvantages of various sampling methods and data-collection approaches. Understanding key modelling assumptions such as particles, rigid bodies, smooth surfaces, light strings, and constant acceleration. Knowing how these assumptions simplify real-world situations into idealised mathematical models.	process, such as choosing an appropriate sample size or constructing unbiased survey questions. Interpreting the implications of sampling choices when drawing conclusions or generalising from data. .

Checkpoint: Vocab/ Knowledge/ Disciplinary skill(s)	**What does this assessment look like?**	**Which disciplinary skills do I need to be successful?**
Checkpoint 1: Algebraic expressions Quadratics Equations and inequalities	You will complete an end of unit assessment at the end of the topic	Students develop algebraic fluency, logical reasoning and problem-solving skills by simplifying, expanding and factorising expressions, solving equations and inequalities, and working confidently with quadratics. They learn to choose efficient methods, connect algebraic and graphical representations, justify their working and check the accuracy of their solutions.
Checkpoint 2: Graphs and transformations	You will complete an end of unit assessment at the end of the topic	Students develop graphical fluency, reasoning and problem-solving skills by interpreting and sketching graphs, applying transformations and linking equations to their graphical representations. They learn to recognise key features, predict the effect of transformations, make connections between algebra and graphs, and justify their mathematical reasoning
Checkpoint 3: Modelling in mechanics	You will complete an end of unit assessment at the end of the topic	Students develop mathematical modelling, problem-solving and reasoning skills by translating real-life situations into mathematical models. They learn to make assumptions, apply appropriate mechanics principles, interpret results in context, check whether solutions are realistic, and refine models where necessary.
Checkpoint 4: Data collection	You will complete an end of unit assessment at the end of the topic	Students develop statistical reasoning, critical thinking and analytical skills by planning appropriate data collection methods, selecting suitable sampling techniques and identifying potential sources of bias. They learn to organise and interpret data, evaluate the reliability of results and justify conclusions using statistical evidence.

Milestone assessment:

The average of the following skills checks :

Algebraic expressions; Quadratics; Equations and inequalities; Graphs and transformations; Modelling in

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mechanics; Data collection		
Vocab: Intercept Gradient Equation Factor Expand Population Force Mass Speed Resistance Lamina	**Knowledge tasks:** Students will develop strong foundations across algebra, statistics and mechanics. They will learn to manipulate algebraic expressions, solve equations and interpret graphs, while developing an understanding of different types of data, sampling methods and how reliable data is collected. In mechanics, students will learn how mathematical assumptions simplify real-life situations so they can be represented and analysed using mathematical models.	**Disciplinary tasks:** Students will develop confidence in reasoning, problem solving and applying mathematics to real-life situations. They will learn to choose efficient methods, interpret graphs and data, and judge whether answers and mathematical models are reasonable. In statistics, students will evaluate sampling methods, recognise bias and limitations, and consider how reliable conclusions can be drawn from data. In mechanics, students will assess the assumptions used in mathematical models and understand how these can affect the accuracy of predictions. .

How can I achieve in this topic?

- Complete all exercises in the unit
- Engage 100% in lessons
- Use self-study periods to complete the mixed exercises
- Make good notes/examples in lessons and use them

Further research:

- Maths Genie • Learn A Level Maths for Free
- Calculator Suite - GeoGebra